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deciduous set being complete. Further study is required in order to determine whether the contrasting conditions for the two sets of teeth indicate variations in manifestation, different times of gene action, or other causal conditions.

Indications of a possible relationship between deciduous and permanent lower incisors have been observed, although the data are too meager for an accurate interpretation. So far, no relationship has been found between the missing bicuspids and the deciduous set of teeth.

Once the types of heredity have been established for the dental anomalities, the traits can be used in linkage studies with other hereditary conditions. By linkage relationships, one can hope for a future advantage in determining the probability that a given person in a kinship will develop a familial diseased condition. Linkage studies in man, or the mapping of genes, are now being made by several investigators.

The desired use of linkage data in man can be best shown by an example. In a family showing hereditary ataxia, a member of generation IV had three ataxic ancestors. In the kinship, ataxia develops at an average age of twenty-four; but a child of an ataxic person cannot feel free until he is at least thirty. The person in generation IV knew that he had a 50:50 chance to become ataxic; yet he produced a child when he was only twenty-six years old. If from linkage studies, the person could have been told that he had a 9:1 chance, for example, to become ataxic, he probably would have postponed the production of children until he had passed the age of onset for the disease.

The dental studies are made to determine the part heredity plays in the development of teeth. They also have broader purposes. The information will be of use to the persons involved, to the dental profession in their care of the deciduous teeth, and possibly to the medical profession in future predictions which will make for early recognition and treatment of other serious anomalies.

A REPORT ON IMPACTIONS AND CONGENITAL ABSENCE OF TEETH, WITH SPECIAL EMPHASIS ON THE THIRD MOLAR AMONG ONE HUNDRED AND SIXTY-TWO UNIVERSITY OF MINNESOTA MALE STUDENT ATHLETES

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ABSTRACT

The findings presented here are based on a study of X-rays of 162 university students from the athletic department. The study is

limited to the presence or absence of third molars. This group has formerly been reported on in a comparative study with other university students as to cary frequency and strength of the muscles of mastication; also general trends and pattern of congenitally missing teeth in 100 patients from the dental clinic at the School of Dentistry, University of Minnesota.

STUDIES ON THE EFFECTS OF INDOLEBUTYRIC ACID IN NUTRIENT SOLUTIONS ON THE ROOT MORPHOLOGY OF THE BILOXI SOYBEAN

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ABSTRACT

In these studies previously germinated soybeans were grown in water cultures (containing complete nutrient solutions) and in addition indolebutyric acid in different concentrations. Indolebutyric acid showed a twofold effect on the roots of soybeans. Firstly, indolebutyric acid caused the initiation of a larger number of roots per unit area. Secondly, indolebutyric acid showed an inhibiting effect on the elongation of both primary and secondary roots.

CYTOLOGICAL STUDIES ON THE EFFECT OF ISOPRENE ON THE EMBRYOLOGY OF THE CHICK BRAIN

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ABSTRACT

The purpose of this study was to determine the effect of the very reactive compound isoprene on the chick brain. In addition to the practical use of this compound and compounds related to it in the

rubber industry, isoprene nucleii make up an integral part of the molecules of Vitamin E, Vitamin A and various sterols. The ability of this compound to undergo polymerization by 1-4 addition is very interesting and deserves biological study. Since cholesterol, which contains isoprene, makes up a large share of the lipids of the brain, it was thought best to begin study on this organ to see if any cytological effects could be noted during its development.

METHOD: Fertile eggs were incubated for a period varying from 7 to 11 days. Just before incubation, the eggs were punctured with a number 18 hypodermic needle and .5cc of 1% emulsion of Isoprene in saline solution (freshly made up each time) was injected with a hypodermic needle into the air space. The hole in the shell was immediately sealed with paraffin. A like number of eggs was injected with normal saline as controls. Both procedures were done under aseptic conditions as far as possible. The embryos were killed at periods varying from 7 to 11 days by breaking the shells, removing the heads and fixing them in formalin. Sections were made beginning in the diencephalon through the optic vesicles. Further sections were made caudally through the mesencephalon, mylencephalon and spinal chord. Sections were made 8 microns in thickness. Two methods of staining were employed, thiamin and bodin silver stain.

From studies made thus far, nothing very definite can be reported at present. There is a suggestion, however, of a lack of mitosis in the epyndamal layer of the brain of the embryos taken from the eggs injected with isoprene as compared with the controls. Extensive studies are now being carried on with isoprene and its related compounds employing several additional techniques.

ANTIHEMORRHAGIC EFFECT OF HONEY

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ABSTRACT

Honey, both of the dark and light varieties, mixed with an antihemorrhagic vitamin deficient ration and fed to chicks whose blood clotting time was more than an hour, showed an antihemorrhagic potency per gram slightly greater than that of 0.25 micrograms of the standard vitamin K (2-methyl-1, 4-naphthoquinone).

It was also found that the full antihemorrhagic activity of honey, alfalfa hay, and even 2-methyl-1, 4-naphthoquinone is not manifested if these substances dissolved or suspended in water are administered to vitamin K deficient chicks.

HISTOLOGICAL OBSERVATIONS ON EXPERIMENTAL ANIMALS FED HUMAN DIETS LOW IN THE VITAMIN B COMPLEX

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ABSTRACT

Groups of rats were fed a vitamin B-low human diet to which known amounts of some of the fractions of vitamin B were added to the bread component. In the group fed the unsupplemented human diet, sperm were absent in the testes. Spermatogenesis was arrested, and the tubules contained enlarged, multinucleated spermatocytes (2-12 nuclei). The thyroid presented a hyperplastic appearance. Lumina of the follicles were small (sometimes obliterated) and the colloid stained abnormally. The epithelium was significantly higher than in the controls. In the anterior lobe, the acidophils (comprising 37.4% of the cells) frequently showed degranulation. The percentage of the basophils was approximately normal. The chromophobes had increased to 58.7%.

In the group supplied the diet supplemented with riboflavin, the germinal epithelium of the testes was slightly abnormal but sperm were present in the tubules. The hyperplastic changes in the thyroid were more pronounced, the acinar cell height being even greater than in the previous group. In the anterior lobe, the eosinophils comprised 38.6% and the chromophobes 57.8% of the cells.

In the group eating the diet in which whole wheat bread was substituted for white bread, the testes appeared normal. The thyroid follicles, however, infrequently exhibited abnormally stained colloid. The cells of the anterior lobe were distributed as: 40% acidophils, 5% basophils, and 55% chromophobes.

THE PRESENT STATUS OF "SWIMMER'S ITCH" IN NORTHERN MINNESOTA

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ABSTRACT

Two larval trematodes (*Cercaria elvae* and *C. stagnicolae*) have been identified as the primary cause for schistosome dermatitis in Northern Minnesota lakes. *C. douthitti* probably is of lesser importance. *Stagnicola emarginata serrata* is the predominant snail in Lake Bemidji; they are infected with *C. stagnicolae* to the extent of 12.3 per cent. In general dermatitis is most prevalent where the

cercarial infection among the snails is the greatest. *C. elvae* is the primary cause for the dermatitis in Grace Lake; its host is *Lymmnaea stagnalis jugularis.*

In an effort to determine the definitive hosts over 200 water birds of 16 different species were examined. Adult schistosomes were found in the Ringbill gull only.

All efforts to experimentally infect young Herring gulls, Mallard ducks, Ringbill gulls, Common terns, and chick embryos with both *C. elvae* and *C. stagnicolae* failed.

SNOW MOLD OF GRASS IN MINNESOTA

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RECENT DEVELOPMENTS IN THE CONTROL OF APPLE SCAB

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PROBLEMS IN FORAGE RESOURCE MANAGEMENT IN MOUNTAINOUS COLORADO

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ABSTRACT

Ordinary mountain wild lands, such as those contained in the National Forests, are about 30% untimbered. This vegetation, mainly grassland, sage brush and oak brush, may be greatly modified by the type of management to which it is subjected. While the timbered areas also contribute almost an equal amount of forage they do not exhibit such marked reactions to treatment, except in extreme cases.

These native pasture lands were originally characterized by bunchgrasses and mixtures of grasses. In some places close grazing has tended to favor entry of subclimax species such as gramá and short muhlys as well as sagebrush and rabbitbrush. This type of vegetation may produce as much as 35% less forage by weight and does not hold the soil as well as the original natives. Oak brush shows various responses to grazing and must be managed with consideration of the local topographic and soil conditions.

Careful forage inventories have been made for about 40% of

the National Forests in southern Colorado and these data are now available as a guide to present and future policies. An average square mile of native mixed grass range will supply feed for 40 head of cattle for an ordinary summer grazing season of 4 months. Similar averages have been calculated for the 9 other main types of vegetation, their capacities varying from 12 to 70 head. In our efforts to increase livestock and wool supplies we must guard against plant and soil destruction that will obviously jeopardize sustained forage production.

THE FOREST-TUNDRA ECOTONE ON THE EAST COAST OF HUDSON BAY

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ABSTRACT

On the east coast of Hudson Bay the broad forest-tundra eco tone (transition zone) is an irregular patchwork of the two vegetation types. Investigations at northern tree limit suggest that the northward decrease of forested areas results from decreasing area of suitable soils. The latter is correlated with proximity to the center of glaciation and the associated decrease in (1) the length of time since ice left the region, (2) quantity of fragmental rock material, (3) favorableness of climatic conditions responsible for soil formation.

Trees grow in *all* situations providing adequate anchorage and water. Field observations and duplication photographs taken 40 years apart demonstrate that the forest is spreading locally. Uniformity of growth in individual spruce trees and a paucity of conspicuously narrow growth-layers testify to a favorable regional climate. Conclusion: potential *climatic* tree limit is an unknown distance north of *actual* present forest boundary. Given adequate time, even without climatic change, forest will occupy all land surfaces in the forest-tundra ecotone.

A STUDY OF SPERM VIABILITY IN A MUTANT *DROSOPHILA*, SHOWING DECREASED FERTILITY

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ABSTRACT

A series of alleles of the lozenze locus in *Drosophila melanogaster* produces an extremely low fertility, both in homozygous condition

and in various compounds. One of these, homozygous glossy, has been studied closely in order to ascertain the cause of the decreased fertility. The glossy female had earlier been shown to lack parovariae and spermathecae. In this study, the actual transfer, storage, and viability of the sperm in the female genital ducts was studied, both in glossy and in control flies. The normal amount of sperm appeared to be transferred to the uterus of the glossy female by the male, but the amount initially stored in the tubular receptacle was found to be considerably lower, but not low enough to be considered the principle factor affecting fertility. The sperm in the receptacles of the glossy females lost their swimming movements earlier than in the normals. Observations made on the eggs and the structure of the receptacle, both in fresh and stained preparations, revealed no differences between the glossy and normal females. The decreased fertility of glossy females is thus evidently due to an impairment of sperm viability, due perhaps to the lack of parovaria secretion or some other physiological condition.

STUDIES ON THE ACTION OF THE VESTIGIAL MUTANT IN *DROSOPHILA MELANOGASTER*

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ABSTRACT

The influence of prolongation of the developmental time upon the phenotypic manifestation of the recessive mutation, vestigial wing, in *Drosophila melanogaster* was investigated. It was found that in individuals heterozygous for the vestigial gene, prolongation of the larval life resulted in a shift toward the vestigial phenotype. The frequency and degree of this shift was correlated with the extent of prolongation of the third larval instar. Effects of prolongation on artificial aneuploids possessing in one case, one vestigial gene and two normal alleles and in another case, two vestigial genes and one normal allele showed that the degree of shift toward the vestigial phenotype was related to the number of vestigial genes present in the genome. It was also found that larval nutrition and developmental temperature markedly influenced the shift in phenotype.

Physical Science

THE CLIMATES OF MINNESOTA

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ABSTRACT

It is proposed here to discuss the climate of Minnesota in terms of the effectiveness of precipitation and temperature and to describe the climatic regions in terms of a world system. Precipitation effectiveness (abb. P-E) is computed by Thornthwaite's formula from monthly precipitation and temperature data. In Minnesota the P-E ranges from 40 in the northwest to more than 72 in the northeast, on a world scale of 0-128. A study of the P-E values for the various stations in Minnesota reveals three distinct moisture regions: the Arrowhead Region, the most humid; the great middle portion of the state, less humid; the Red River Valley, the driest part. Minnesota with an average precipitation of 25 inches has a P-E comparable to that of east central Texas with 40 inches, and to central Flordia with 50 inches. If the P-E values are valid, the inadequacy of rainfall data alone as an index of moisture, is clearly indicated.

In determining temperature effectiveness (abb. T-E) it is assumed that values below freezing have zero efficiency. To obtain the T-E of a station for a certain month subtract 32 from the average Fahrenheit temperature and divide by four. The T-E values for Minnesota range from 37 in the northeastern part of the state to more than 50 in the south, on a world scale of 0-128. The T-E values for Minnesota are comparable to central Michigan, southern New Hampshire, or eastern Washington.

Combining the P-E and T-E values for Minnesota and selecting critical limits, it is possible to outline five climatic regions. Region I corresponds roughly to the Arrowhead region which is the most humid with all P-E values over 64; it is also the coolest in summer. Region II lies in the middle portion of the northern border with P-E values from 48-64, T-E values less than 40. Region III includes all but the southern portion of the Red River valley, with P-E less than 48 and T-E averaging 40. Region IV is in the central part of the state with P-E from 48-64 and T-E from 40-48. Region V is in the south with P-E similar to region IV but with T-E more than 48.